

REMARKS

Favorable reconsideration, reexamination, and allowance of the present patent application are respectfully requested in view of the foregoing amendments and the following remarks.

Objection to the Specification

At page 2 of the Office Action, the Specification was objected to because it allegedly referenced the claims. Applicant respectfully requests reconsideration of this objection, in view of the amendments to the specification, submitted in the paper filed 15 March 2006, deleting such references.

For at least the foregoing reasons, Applicant respectfully submits that the Specification is not objectionable, and therefore respectfully requests withdrawal of the objection thereto.

Rejection under 35 U.S.C. § 102

In the Office Action, beginning at page 3, Claims 1-3 and 6-8 were rejected under 35 U.S.C. § 102, as reciting subject matters that allegedly are anticipated by U.S. Patent No. 6,205,764, issued to Hermann *et al* ("Hermann"). Additionally, Claims 1 and 5 were rejected under 35 U.S.C. § 102, as reciting subject matters that allegedly are anticipated by U.S. Patent No. 5,487,265, issued to Rajamani *et al*. ("Rajamani"). Applicant respectfully requests reconsideration of these rejections.

This application describes methods for changing thermoacoustic oscillations in combustion systems embodying principles of the present invention. In a combustion system having a combustor in which a recirculation zone is formed, injecting fuel into this recirculation zone in a modulated manner can have advantageous effects on these oscillations. It has been shown that, as a result of such modulated injections, suppression of the thermoacoustic oscillations can be considerably improved. As a result of injecting fuel into the recirculation zone, the vortex systems forming in the combustor and affecting one another can be intensely changed. Since the vortex systems present in the combustor are significantly involved in the production of thermoacoustic oscillations, thermoacoustic oscillations can be changed by means

of specific, modulated fuel injection.

Claim 1 relates to a method of affecting thermoacoustic oscillations in a combustion system having at least one burner and at least one combustor, comprising modulating fuel injection into a recirculation zone which forms in the combustor. The prior art, including both *Hermann* and *Rajamani*, fails to identically disclose or describe a method as recited in the pending claims.

Hermann discloses, in the only drawing figure, a combustor 4 with at least two hybrid burners 5, each including a premix burner 6 supplied with fuel by a fuel supply line 23 and a pilot burner 7 supplied with fuel by a fuel supply line 24. In the fuel supply lines 24 of the pilot burners 7, an actuating member 8 is integrated to control the supply of fuel, in order to affect thermoacoustic oscillations by means of fuel modulation. *Hermann* fails to disclose a specific ratio between the modulated fuel and the unmodulated fuel.

The Office Action assumes that fuel injected via the pilot burner automatically is injected into the recirculation zone of the combustor, which is an assumption that cannot be made. It is axiomatic, that a recirculation zone can not be established in every known combustor. Instead, only if very specific aerodynamic conditions are achieved, can a recirculation zone be formed. For example, the fuel-air mixture must have intensive swirl at the inlet of the combustor, and the combustor must have a significant “jump like” widening in the cross section at its inlet. Since *Hermann* fails to disclose any hint of these features, there is no reason to assume that the pilot burners will inject their fuel into a recirculation zone of the system. Indeed, *Hermann* discloses only that it is possible to affect thermoacoustic oscillations by fuel modulation of fuel supplied to the pilot burners; where these pilot burners inject their fuel is not mentioned in *Hermann*. Therefore, *Hermann* plainly fails to identically disclose or describe any recirculation zone, and therefore cannot disclose modulating fuel injection into a recirculation zone as recited in the pending claims.

Rajamani discloses the general possibility of affecting thermoacoustic oscillations by fuel modulation. *Rajamani* fails to disclose a specific location for the injection of the modulated fuel. *Rajamani* also fails to disclose a specific amount or ratio for the fuel to be modulated. Thus, for

reasons substantially the same as those presented above concerning the rejections over *Hermann*, *Rajamani* also plainly fails to identically disclose or describe any recirculation zone, and therefore cannot disclose modulating fuel injection into a recirculation zone as recited in the pending claims.

For at least the foregoing reasons, Applicant respectfully submits that the subject matters of Claims 1-3 and 6-8 are not anticipated by *Hermann* or *Rajamani*, are therefore not unpatentable under 35 U.S.C. § 102, and therefore respectfully requests withdrawal of the rejection thereof under 35 U.S.C. § 102.

Rejection under 35 U.S.C. § 103(a)

In the Office Action, beginning at page 5, Claim 4 was rejected under 35 U.S.C. § 103(a), as reciting subject matters that allegedly are obvious, and therefore allegedly unpatentable, over *Hermann*. Additionally, Claims 1-8 were rejected under 35 U.S.C. § 103(a), as reciting subject matters that allegedly are obvious, and therefore allegedly unpatentable, over EP 0985810 and DE 19948673, “as applied in applicant’s European application no. EP 03104406.” Applicant respectfully requests reconsideration of these rejections.

Claim 4 relates to the subject matter of Claim 2, in which the second, modulated quantity of fuel is approximately between 6% and 1% of the total quantity of fuel.

Applicant respectfully submits that there is a difference between very simple optimization procedures, on the one hand, and complex optimization procedures, on the other hand, and that the specific art in which this invention is involved requires complex optimization procedures. A simple optimization would be, *e.g.*, the adjustment of a single parameter, in particular within an open loop control, wherein the adjustment of the single parameter only affects a single output signal or only a small number of output signals. For example, finding the best frequency for fuel modulation within a stationary operation mode of a turbo machine may be such a simple optimization.

A complex optimization procedure would include the adjustment of several parameters, *e.g.*, within a closed loop control, wherein adjusting a single parameter causes variation at

several output signals. Since the combustion process within the combustor is very complex and depends on a multitude of interrelated parameters, the research necessary for finding the optimum working range of the quantity of fuel to be modulated is far beyond ordinary skill, and is therefore not merely a matter of routine optimization.

Concerning the rejection of Claims 1-8 over particular references cited in the EP search report, once again the Office Action has jettisoned the requirements of the Title 35, 37 C.F.R., and their implementations via the M.P.E.P. The Office Action has substituted a shotgun rejection of the claims based on European patent law standards, and without any substantive explanations of these rejections, for the substantive requirements required for a *prima facie* case. Furthermore, that a foreign patent examiner may have an opinion that particular documents are “Y”-type documents, based on that examiner’s understanding of what constitutes an “Y”-type reference under foreign law to claims that were written in a language different from those currently pending, renders the “Y” indication on Search Report of very dubious value when evaluating the pending claims. Accordingly, this additional rejection plainly constitutes a clear error, and Applicant requests its withdrawal.

For at least the foregoing reasons, Applicant respectfully submits that the subject matters of Claims 1-8, each taken as a whole, would not have been obvious to one of ordinary skill in the art at the time of Applicant’s invention, are therefore not unpatentable under 35 U.S.C. § 103(a), and therefore respectfully requests withdrawal of the rejection thereof under 35 U.S.C. § 103(a).

Obviousness-type Double Patenting Rejection

In the Office Action, beginning at page 3, Claims 1-8 were (provisionally) rejected under the judicially-created doctrine of obviousness-type double patenting as reciting subject matters that are allegedly not separately patentable over the subject matters recited in Claims 1-8 of U.S. Application No. 10/725,563 and Claims 1-8 of U.S. Application No. 10/725,564. Applicant respectfully requests reconsideration of this rejection.

M.P.E.P. § 804 *et seq.* set out the minimum requirements for a double-patenting rejection in an Office Action. A brief review of this Office Action’s rejection reveals that the rejection is

so deficient that Applicant has not been fully apprised of the grounds of the rejection, and therefore has been denied the opportunity to fully respond. Subsection II(B)(i) of M.P.E.P. § 804 instructs:

Since the analysis employed in an obviousness-type double patenting determination parallels the guidelines for a 35 U.S.C. 103(a) rejection, the factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103 are employed when making an obvious-type double patenting analysis. These factual inquiries are summarized as follows:

- (A) Determine the scope and content of a patent claim relative to a claim in the application at issue;
- (B) Determine the differences between the scope and content of the patent claim as determined in (A) and the claim in the application at issue;
- (C) Determine the level of ordinary skill in the pertinent art; and
- (D) Evaluate any objective indicia of nonobviousness.

The conclusion of obviousness-type double patenting is made in light of these factual determinations.

Any obviousness-type double patenting rejection should make clear:

- (A) The differences between the inventions defined by the conflicting claims - a claim in the patent compared to a claim in the application; and
- (B) The reasons why a person of ordinary skill in the art would conclude that the invention defined in the claim at issue would have been an obvious variation of the invention defined in a claim in the patent.

The entirety of the explanations offered in the Office Action is, in fact, only the boilerplate in the form paragraph appropriate for such rejections (8.35). Indeed, that form paragraph instructs the patent examiner to provide an explanation of why the claimed subject matters are allegedly patentably indistinct; instead of providing that required element of the rejection, the Office Action ends the form paragraph with a period, thus purposefully not providing the required explanation.

The rejection is thus devoid of any explanation why Claims 1-8 are not separately patentable from Claims 1-8 of the '563 and '564 applications, including what are exactly the differences in their respective subject matters. By these failings, the Office Action has denied the evaluation of Claims 1-8 to which they are entitled (35 U.S.C. § 132; 37 C.F.R. § 1.104), and

also have no substantive positions to rebut.

For at least the foregoing reasons, Applicant respectfully submits that the subject matters of Claims 1-8 are separately patentable over the subject matters of Claims 1-8 in the '563 and '564 applications, and therefore respectfully requests withdrawal of the rejection thereof.

New Claims

New Claim 16 has been added. Claim 16 relates to a method similar to that recited in Claim 1, and is therefore allowable for at least the same reason. Claim 16 further recites that a burner and combustor are provided, including an abrupt widening of a flow cross-section between the at least one burner and the at least one combustor. The abrupt widening causes flow to form a recirculation zone in the at least one combustor. The method includes swirling flow through the at least one burner and modulating fuel injection into the recirculation zone. As discussed in great detail herein, modulating fuel injection can stabilize the flame in the system, thus providing the possibility of reduced NO_x emissions. As also discussed at length above, none of the prior art discloses, describes, or suggests a combination of steps as recited in Claim 16. An early indication of the allowability of Claim 16 is therefore earnestly solicited.

Conclusion

Applicant respectfully submits that the present patent application is in condition for allowance. An early indication of the allowability of this patent application is therefore respectfully solicited.

If Mr. Basichas believes that a telephone conference with the undersigned would expedite passage of this patent application to issue, he is invited to call on the number below.

It is not believed that extensions of time are required, beyond those that may otherwise be provided for in accompanying documents. If, however, additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. § 1.136(a), and the Commissioner is hereby authorized to charge fees necessitated by this paper, and to credit all refunds and overpayments, to our Deposit Account 50-2821.

Respectfully submitted,

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¹ 37 C.F.R. § 1.4(d)(3)